boniferous limestone in a large part of the neighbourhood of Cleator and find immense bodies of ore to reward him."

It is claimed for the Cleator Linen Thread Mill (now included in the great Thread Combine) that it is "the oldest flax-spinning mill in the country, and perhaps in the world." Winding thread on spools was first started here, the thread having previously been done up in hanks. It is strange, therefore, that Mr. Caine, in a dissertation upon place-names, should seek to connect that of a field close to the mill, Linethwaite, with the Anglo-Saxon "linde," a lime tree. It is plain Norse for "flax-field"—*lin-thveit*. A list of the flora and fauna of Cleator is given in an appendix, but it is valueless for any scientific purpose, inasmuch as none but English popular names are given. It does not carry one very far to be told that in this parish are found the linnet, the goose, the orchis, the gentian, etc., with no indication of species.

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## *A COMPOSITE AMERICAN TEXT-BOOK OF GEOLOGY.*

*A Text-book of Geology.* By Prof. L. V. Pirsson and Prof. C. Schuchert. Part i., *Physical Geology.* By Prof. L. V. Pirsson. Pp vii + 444. Price 10*s.* net. Part ii., *Historical Geology.* By Prof. C. Schuchert. Pp. vi + 405–1026. Price 12*s.* net. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1915.)

GEOLOGY, being such a many-sided science, is especially handicapped in regard to text-books. It is provided with a library of books dealing with its various subdivisions and aspects, but the provision of an up-to-date manual which deals with the whole range of the subject in about a thousand pages, and of the standard required by students in higher technical schools and by those taking geology as a secondary subject in universities, is a perennial difficulty. Specialisation in geology has gone so far that it is becoming impossible for any one author to deal with the whole science in the detail required in such a work. The new text-book of geology by Profs. Pirsson and Schuchert, with chapters by Profs. Barrell and Lull and Dr. Ulrich, show the effort to overcome this difficulty by joint authorship. That method has its own drawbacks, for it is very difficult thus to secure that unity of view and uniformity of standard which are indispensable in an educational text-book.

The first part of this work, by Prof. Pirsson, deals with physical geology. It is divided into two divisions, dynamical and structural, and in the course of 400 pages gives a most excellent summary of these subjects. Its illustrations are numerous and clear, and are all useful. Those illustrating the geological conditions of arid regions are especially good. His account of the igneous rocks is short and conservative, and British teachers may be grateful for the fact that he does not mention the American classification or adopt its terminology. A few relatively unimportant slips occur, such, for example, as the remark on p. 178 that the one boring in a coral atoll in the Pacific shows a thin cap of coral "on the volcanic rock which forms the main mass." The author attributes (p. 79) the fact that the Caspian is fresher than ordinary seas to the precipitation of its salt in Karabugas; but it would appear more probably due to the former dilution of the Caspian by the Volga. Prof. Pirsson introduces into geology the term "nonconformity" for those varieties of unconformity in which the dip of the formations is visibly different; for the other section of unconformities he accepts Grabau's term of disconformity. His description of potholes as a minor feature would appear to underrate their significance, for their formation is probably the main process by which mountain streams deepen their valleys in hard rock.

The chapter on the formation of mountains is one of the most interesting in the volume. In spite of some American opinions to the contrary, the author concludes that the crust is contracting in consequence of the lessened volume of the earth as a whole; and he is disposed to attribute the shrinkage, not to cooling, but to chemical changes in the internal material. He adopts also the steadily growing view that crustal movements occur with a rhythmic periodic progression; but the author will surprise many of his readers by his conclusion that the earth, "except locally or to a superficial depth, may not be hot, at least in any such sense that it could experience the notable contraction from loss of heat demanded for the origin of the folded ranges" (p. 366). The author refers to recent suggestions throwing doubt on the origin of the West American block mountains by faulting; but he concludes that the dominant processes in the formation of many, if not most, of these ranges are the faulting of the region and the tilting of the blocks. In his classification of mountains it is perhaps a pity that the author has not adopted the usual sequence of terms. He reverses the order of chain and system, and represents several mountain systems as forming a mountain chain; and he continues that a combination of mountain chains constitutes a cordillera. The term "cordillera" seems best restricted to a mountain system such as the Andes, composed of parallel chains.

Prof. Schuchert's part of the work, which is also published as a separate volume, consists of a most interesting series of essays. But it would appear of less use to British students as a college text-book than the first part. It is overweighted at the start by the long hypothetical pre-geological history of the earth. The arrangement of the material, and such illustrations as the portraits of geologists, are less suitable for the technical student than for the general reader; thus most students would probably have found it more convenient to have the descriptive palæontology all

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together instead of distributed between the stratigraphical chapters.

Among the excellent features of this part is an explanation of the binomial nomenclature, which students are often expected to understand without any such help; but though the first edition of the "Systema Natura" was published in 1735, that is not accepted as the date of the establishment by Linnæus of the binomial system. The relegation of the technical names of the fossils illustrated in the text to an appendix is symptomatic of the present state of palæontological nomenclature; only general names are given in the legends of the figures. The use of popular names has the drawback that they vary so much locally, and English students are not likely to know what are meant by Sowbugs or Pillbugs (p. 605). The author accepts as undoubted the identification of some impressions in pre-Cambrian rocks of Brittany as radiolaria, though this conclusion is rejected by some who have examined the material. There is less evidence for the author's view that Eozoon is a calcareous alga than for its original reference to the Foraminifera, and it seems rather a "bull" to refer to some of these plants as fresh-water seaweeds.

In the historical geology the chief departures from the usual classification are the adoption of two additional systems; of these the Ozarkian System occurs between the Cambrian and the Ordovician, but as the Beekmantown beds are excluded its value appears doubtful. If the Beekmantown and allied faunas be included in the Ozarkian System a much stronger case could be made out for it. The Lower Cretaceous is raised to a system, the Comanchian, which includes from the Wealden to Albian inclusive. Prof. Schuchert's account of the historical geography is illustrated by admirable maps of geographical distribution; it gives a most useful summary of the stratigraphy of North America, and its up-to-date account of the principles of stratigraphy could be read with advantage by all British teachers of geology; but as the historical geology of the British area is incomplete and less accurate, this part of the volume will be of less value to British students than Prof. Pirsson's section.

The most serious drawback to this valuable text-book is the absence of references.

J. W. G.

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## RADIOGRAPHIC METHODS.

*Localization by X-rays and Stereoscopy.* By Sir J. Mackenzie Davidson. Pp. xi+72+xxvi plates. (London: H. K. Lewis and Co., Ltd., 1916.) Price 7*s*. 6*d*. net.

IN this book the author describes in detail several of the methods which have been devised for the accurate localisation of foreign objects in the human body.

The first two chapters deal with the experimental conditions which should be observed in order that good radiographs may be obtained, and with some simple yet excellent experiments illustrating the radiographic advantage of a good focus-point on the anti-kathode. The undesirable effects of secondary radiation receive mention; they are responsible for a good many of the defects which occur in radiographs, and constitute a danger (second only to the primary rays) to the operator, which the author does well to insist upon.

The main facts of X-ray stereoscopy are described and illustrated. By transposition of two stereoscopic photographs the point of view of the observer becomes reversed; some explanation of this would be of great assistance to the beginner.

The advantages of stereoscopy to the surgeon who is to remove the foreign object are obvious, and we agree with the author that some successful method of rendering stereoscopic images upon a fluorescent screen would be a great advance on present procedure. There are, however, many experimental difficulties to be overcome before this can be effected.

The author has done much to elaborate a precise means of localising foreign objects in the human body, and all the details of the "cross-thread" method are entered into. In cases where a foreign body is lodged in the eye or the orbit, precise localisation is absolutely essential; the chapter devoted to such cases is perhaps the best in the book.

The author directs attention to the misleading nature of a single X-ray photograph, but describes a method by which the depth of a foreign body below the surface may be obtained by means of a single X-ray exposure; this method entails the use of two sets of cross-wires which are placed at a known vertical distance apart. An oblique ray from the anti-kathode casts a shadow of the foreign body and of the lower set of cross-wires with respect to the other set of cross-wires, which is in contact with the photographic plate; simple measurements from the single photograph give the vertical depth of the foreign body below any point previously selected on the surface.

The book closes with a series of twenty-one stereoscopic illustrations on plates, which will repay careful study; it is worth noting that stereoscopic vision may be very considerably improved by practice.

Much of the wreckage of human life occasioned by the war would be past repair were it not for the extra vision vouchsafed to the surgeon by X-rays; whether in dealing with projectiles which have entered the body or in the damage to the structures, bony and otherwise, methods have been evolved which enable the surgeon to know exactly where to look and almost as surely what to find. The attitude of the author is that too much information cannot be given to the surgeon thus engaged, and it is safe to say that the methods of localisation described, together with a stereoscopic picture of the foreign body giving its relation to the neighbouring anatomical parts, inspire confidence.

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